HOW TO EFFECTIVELY USE

FLIPPED LEARNING

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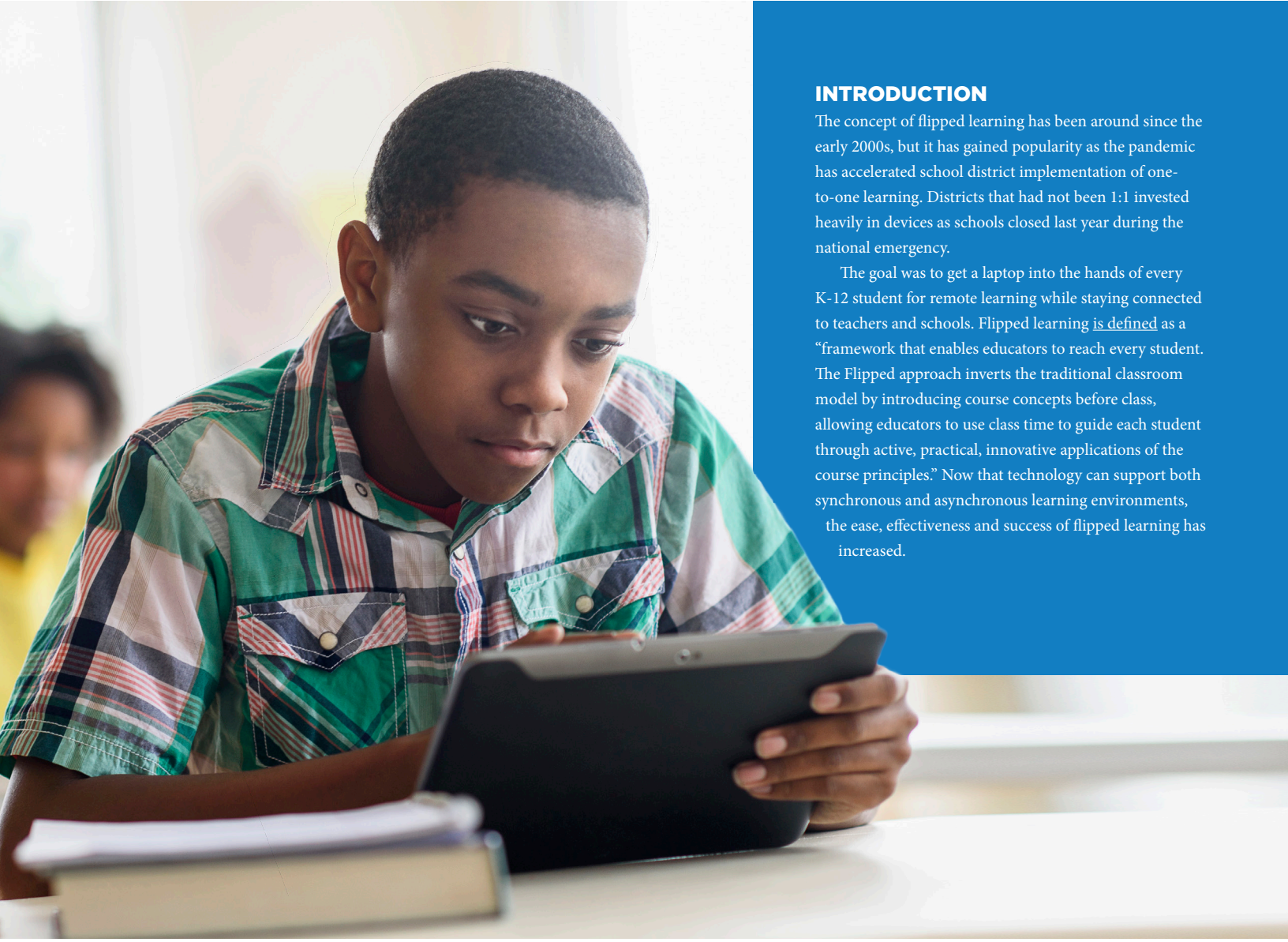
TECH & LEARNING



INTRODUCTION

The concept of flipped learning has been around since the early 2000s, but it has gained popularity as the pandemic has accelerated school district implementation of one-to-one learning. Districts that had not been 1:1 invested heavily in devices as schools closed last year during the national emergency.

The goal was to get a laptop into the hands of every K-12 student for remote learning while staying connected to teachers and schools. Flipped learning is defined as a "framework that enables educators to reach every student. The Flipped approach inverts the traditional classroom model by introducing course concepts before class, allowing educators to use class time to guide each student through active, practical, innovative applications of the course principles." Now that technology can support both synchronous and asynchronous learning environments, the ease, effectiveness and success of flipped learning has increased.

ALL DEVICES ARE NOT EQUAL FOR FLIPPED LEARNING

Schools and districts shifted into high gear at the beginning of the pandemic to get school-owned mobile devices into students' hands. Hundreds of thousands of laptops, tablets and iPads were purchased and distributed, along with hot spots for those students who did not have reliable internet at home.

In a survey early in the pandemic conducted by Firstbook, commissioned by Intel to determine how COVID-19 was affecting students in poverty, teachers estimated that as many as 40% of their students did not have access at home to a reliable internet connection. Thirty-seven percent of students did not have access to functioning digital devices to keep up with online learning and 57% of student households did not have enough devices per person.[1]

The right kind of technology is a critical component of supporting the flipped classroom. Challenges that include device storage, demands of the device during video conferences and functionality of applications when no internet connection is present must be addressed for virtual and online learning to be successful.

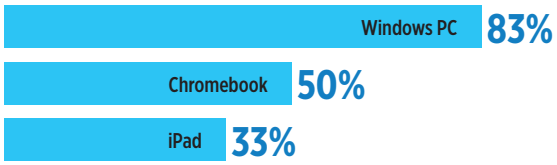
A research study commissioned by Intel on how connectivity, operating systems and type of devices affect teaching and learning outcomes for virtual and blended environments was published in August 2020 as most schools continued to use a remote-learning model for the beginning of the school year. Key findings from the study include:

- Education applications and browser extensions have limited or no functionality when not connected to the internet. It depends on the operating system.
- All platforms require connectivity on the first use of devices to provision applications and federate login credentials that provide users to multiple applications with a single password.
- Device storage is needed to support devices that do not have reliable, high-bandwidth connection to the internet. Expandable storage options, such as SD cards and USB drives should be considered to deliver curriculum materials.
- Offline access to most LMS services is either limited or unavailable. Some LMS systems, such as Canvas, allow users to download an entire module as an HTML or ePUB file, which can be used as a workaround for students who lack connectivity.
- Most core curricula do not have digital applications or mobile access to support offline use.
- Enabling and accessing files stored on Google Drive for offline use is a complicated process.[2]

To support flipped learning, schools need to focus on robust platforms that deliver performance, security, stability and manageability. Of the devices and operating systems that were evaluated during the study, the results were clear. Offline completion rates of activities were determined by the type of mobile device students were using and the amount of file

[1]Retrieved from https://firstbook.org/wp-content/uploads/2020/07/200714_FBCovidResponse_Survey.pdf; [2]Retrieved from https://www.k12blueprint.com/sites/default/files/Intel%20Curriculum%20Platform%20Evaluation_2020.pdf

storage in those devices. The offline task completion rate by device types were:



Researchers found that Windows-based laptops with ample storage capacity can help solve many of the challenges that the lack of internet connectivity creates for both students and teachers. While other platforms, including Chromebooks and iPads, do offer some offline capability, there are significant gaps in functionality. "Students who do not have home internet access … spend more time on their homework, have lower grade point averages and have weaker digital skills, even after controlling for socioeconomic factors that potentially influence academic performance," researchers said.[3]

The table below of the storage capability of the devices evaluated during the study clearly shows that for students who have unreliable access to bandwidth, a Windows 10 device has the storage capabilities to support a full day's classes.

	Windows 10	Chromebook	iPad
Storage available for curriculum and student work	84.6 GB	17.2 GB	24.7 GB
Maximum number of classes supported	5.5	1.1	1.6

COVID-19 ACCELERATES TECHNOLOGY IMPLEMENTATIONS

Some schools and districts chose to accelerate existing tech implementation plans and some took advantage of pandemic resources to make a significant investment in technology to support online learning. The silver lining from the pandemic experience is that hundreds of thousands of students now have sufficient access to devices and broadband to support remote and hybrid learning models, such as the flipped classroom.

Kim Franklin is principal of the K-4 Casa Blanca Community School on the Gila River Indian Reservation, south of Chandler, Ariz. Prior to the pandemic, the community was already facing a major chasm in the digital divide. Native American families were at high risk for the coronavirus, made even more dire because families often live in multigenerational homes and there's a high percentage of grandparents raising their grandchildren. The school realized early on that they would need to help support students, staff and families.

Facing a crisis with no clear end date, the school board decided to "think big" and not make piecemeal decisions as the pandemic progressed. "We knew early on that we would use CARES (Coronavirus Aid, Relief and Economic Security Act) money for hot

[3]Ibid.

DEVICE AND STORAGE RECOMMENDATIONS FOR DISTRICTS

Educators need consistent and reliable internet connectivity to successfully plan and implement both blended and virtual learning experiences for students.

File sizes: Content such as custom-created videos can result in large file sizes that load or download slowly because of syncing and bandwidth issues, or take up large amounts of storage space on student devices.

For students who need to work offline, storing learning materials on a device requires large amounts of internal storage. Districts should consider using:

Devices with 128 GB or more of storage to help minimize the amount of time students spend managing offline-accessible files.

External storage devices such as SD cards that can be preloaded with curriculum materials and content.

Devices with a minimum of 8 GB system memory to support multitasking and video playback whether offline or connected.

LTE-enabled devices or mobile hot spots to provide connectivity for learning experiences that do not demand significant amounts of data exchange for students who live in areas with good telecommunications coverage.

Native, built-in device applications, tools such as keyboard shortcuts, and installed software rather than downloadable applications for completing simple tasks.

spots for every family," Franklin said. "If a family had more than three children, the family would get two hot spots."

The school applied for an Intel® grant for Title I schools. With that award, the school received laptops with Intel® Core™ i5 processors allowing them to do both synchronous and asynchronous work with students. The largest impact of this award was on the school's special-education program. In the virtual world, special education requires a lot of streaming capacity as there is a lot of video. Another initiative for improved broadband access, initiated by the tribal governor, also improved access for the community.

"Because of these things, we were able to provide true virtual learning: professional development, devices, educational continuity and the same instruction students would have had in school in person," Franklin said. She noted that the technology investment allowed them to explore new learning models, including flipped learning, that integrated technology.

Curtiss Sarikey, chief of staff for Oakland Unified School District in California, and his team decided as soon as the shelter-in-place order was given in March 2020 that they needed a major effort to close the digital divide. They had a 2:1 student-device ratio in schools, but the real issue was home connectivity. Working with community partners, the district transferred 25,000 school computers to student homes. Through a program called Oakland Undivided that they co-founded with the city, the district raised $14 million and purchased 34,000 devices and 10,000 to 12,000 5G hot spots. For families that couldn't use a hot spot, they paid for a connection via Comcast cable.

The district provided computers plus broadband and tech support to all school families. While Chromebooks were adequate for most students, the district used dollars from the CARES Act to upgrade teachers who had previously been using Chromebooks. These were replaced by higher-performance devices that could better manage all the apps used for instruction. "We also found that higher-level courses, such as high-school engineering, required higher-performance devices than Chromebooks," Sarikey said. "Ninety-six percent of our students are now connected and the hot spots can travel with students who are mobile or homeless."

HOW TO ACCELERATE EDUCATION TECHNOLOGY INVESTMENT AT THE STATE LEVEL

Technology upgrades that change teaching and learning can also be led from the state education office. John Kraman is the chief information officer for the Mississippi Department of Education, which created a guidance plan to support districts in leveraging CARES Act funds to implement digital learning programs. The department sees that the future of education in the state and continued growth in student performance depends on effective digital learning programs.

"We wanted all districts to have sufficient capability for digital learning, but we understood that all districts have unique situations," Kraman said. "The core idea was that we wanted to begin with immediate needs and proceed from there." Kraman explained that the goal today is to build digital learning environments that maximize the opportunities of technology without losing the teacher-student relationships at the heart of learning.

Two pieces of landmark legislation helped the state prioritize digital learning as it included devices for all students and teachers with $275 million for devices and services along with $50 million in grants to districts to support connectivity. Importantly, the legislation also paid $75 million to local telecoms to build out the last mile wire. There were 290,000 devices delivered to students and educators, district digital learning plans were published and a statewide training program was created.

"Our goal is to position Mississippi as a leader in equitable education and to create world-class learning," Kraman said. "We made a commitment to this moment to think big and invest in innovation."

EFFECTIVE TEACHING PRACTICES FOR FLIPPED LEARNING

Flipped learning changes the role of the teacher. Instead of spending time in class focused on explanations and recall in the lower levels of Bloom's taxonomy, flipping the taxonomy allows students to use class time to analyze, apply and create. Teachers now can help guide students in the development of higher-level, more complex skills.

The beauty of flipped learning is that with the right technology, it can be used in face-to-face, blended, remote or hybrid learning models. Having students use class time to collaborate with each other on evaluating and assessing content is the most effective and efficient practice of flipped learning.

Joy McCourt is a high-school teacher in Toronto who has been practicing flipped learning since 2013. In her work, McCourt sees many teachers overwhelmed by the number of apps and services available to support students. "Teachers need to streamline and be strategic about each tool they use," she said.

McCourt recommended having a consistent place where students can check in and see what is expected of them every day. "I use a Google slide deck to organize assignments, tools and resources," McCourt said. "Videos, spreadsheets and practice work are all linked together, and I use the LMS that students are already familiar with as the launch pad."

Because students have been feeling isolated through distance learning, McCourt advised to build care and community into daily activities, such as using games to build community through teamwork. To maximize flipped learning activities, she recommended using computers that can handle the kind of system demands required for videos. Computers need to be robust and fast to connect students to the outside world. Students view teacher-created videos at home for overviews or background information on what they will study. Then, they use class time to analyze, evaluate or apply the information.

Hassan Wilson, a biology educator and administrator at Friends Seminary in New York City, said he uses videos for various purposes. "Videos can be used to convey information, preview the week ahead, teach a topic, or demonstrate a tool," he said. Supporting tasks can be used to check for understanding, and class time can be used for hands-on learning or to demonstrate task completion.

These practices allow teachers to spend class time working through deep content face to face with students. Flipped learning requires robust technology, but it is an efficient and effective teaching practice that provides students with higher-level skill-building opportunities.

TECHNOLOGY, FLIPPED LEARNING AND EQUITY

The massive shift to one-to-one learning as a result of the coronavirus means that the future of education will be supported by technology in ways that were not possible prior to the pandemic. New research from Project Tomorrow cataloged the increase in:

- 1:1 devices.
- Awareness of the actions required to mitigate the homework gap.
- Classroom digital content usage.
- Student-teacher text messaging.
- Focus on social and emotional learning and mental health for students and staff.

Julie Evans, CEO of Project Tomorrow, also noted the change in values and belief systems as educators shifted to 1:1 learning. Some of the lessons learned from the pandemic include:

- Technology is not just a tool for student engagement. It is a learning platform.
- Teachers are better informed about quality in digital content.
- Teachers are still not comfortable implementing new learning models; increased usage does not equal efficiency of usage.
- There is an increase in teacher interest in professional learning experiences to support new learning environments post-pandemic.
- Equity is about more than just digital access. It is equally important to address the inequity of learning experiences. There should be more opportunities for success and student agency.

"We need to take this opportunity to change how we think about transformation," Evans said. "Every student has strengths and areas of weakness that need support, and the way to get that support is with technology that can personalize learning." Evans suggested that most of the technology work thus far has been to get teachers comfortable with the mechanics of technology. "We have not spent enough time thinking about how to re-engineer our lessons to take advantage of technology," she said. "Now we can focus on the best way to use technology to meet our instructional goals."

The focus of the speedy shift to remote learning during the start of the pandemic put the emphasis on devices and connectivity. There was very little time to create an informed plan to support effective implementation. Research indicates that younger students were more vulnerable to learning loss than older students, and students from lower-income families were affected more than students from higher-income families, reports Barbara Means, executive director of Digital Promise Global.4 As districts work toward equity, the

pandemic has revealed that devices and connectivity are not enough. All students deserve personalized learning opportunities, along with the resources and coaching required to reach academic achievement.

"Remote instruction during COVID was a test of the 1:1 learning model," Means said. "Having the right technology is important, but good instruction with technology requires aligning to assessments and learning standards." Means went on to say that 1:1 implementations for digital learning need attention to multiple dimensions:

- Learning-ready device and connectivity for every child.
- Digital learning resources, active learning, student-centered pedagogy.
- School leader support and teacher professional learning.
- Tech-integrated models and coaching, tech support and aligned assessment.

Evans added that the pandemic has given teachers freedom to try different things in the online environment. "Many teachers are getting comfortable with customizing content and new learning models," she said. "This is an energizing concept for the future." She said that using active learning strategies, such as project-based learning, will provide students agency and increase engagement. "Active learning is student-directed collaborative learning," Evans said.

CONCLUSION

The shift to 1:1 learning during the pandemic has accelerated the integration of technology into teaching and learning. The vast majority of students now have a device and connectivity at home. This means that new flexible models of instruction and learning, such as flipped learning, can be tested for efficacy. Having the right technology is a prerequisite for blended and hybrid learning models. To see long-term learning gains, however, it is also important that teachers receive professional development opportunities on creating active and collaborative learning environments for their students.

Creating teacher-made videos is an effective way to begin using flexible learning models, such as flipped learning. There is new research demonstrating that students experienced a higher level of engagement and performed better on both retention and knowledge transfer tests after viewing a video lecture with an on-screen instructor.5 The pandemic has accelerated digital learning rollouts across the country, and remote and hybrid learning have taught the importance of supporting these learning models with high-performance technology. As educators and students move back into the classroom, it can be an exciting time to experiment with new learning models that incorporate technology to personalize learning.

[4]Retrieved from https://future.swoogo.com/2021_intel/837007?ref=rt ; [5]Retrieved from https://ucsb.academia.edu/AndrewStull

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